

# Kenneth M. Nollett

## Curriculum Vitae

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<b>Address</b>	Physics Division, Bldg. 203 Argonne National Laboratory Argonne, IL 60439-4843 E-mail: <a href="mailto:nollett@anl.gov">nollett@anl.gov</a> Phone: (630)252-8264 Fax: (630)252-6008
<b>Current Position</b>	2008 – present Physicist Nuclear Theory Group Physics Division Argonne National Laboratory
<b>Education</b>	THE UNIVERSITY OF CHICAGO Ph.D., Department of Physics, 2000  MASSACHUSETTS INSTITUTE OF TECHNOLOGY S.B. in Physics, Concentration in German Language, 1995
<b>Research Interests</b>	Theoretical nuclear astrophysics, nucleosynthesis, presolar grains and extinct radioactivities in meteorites, nuclear reactions, few-body nuclear physics, cosmic rays, cosmology
<b>Past Positions</b>	2003–2008 ASSISTANT PHYSICIST, Physics Division, Argonne National Laboratory  2002–2003 POSTDOCTORAL RESEARCH ASSOCIATE, Institute for Nuclear Theory, University of Washington. Supervised by Wick Haxton. Research in ultra-high-energy cosmic rays, computational methods for the nuclear shell model, nuclear scattering with the variational Monte Carlo technique  2000–2002 POSTDOCTORAL SCHOLAR IN PHYSICS, California Institute of Technology. Supervised by G. J. Wasserburg, Marc Kamionkowski. Research in AGB star nucleosynthesis, presolar grains, cosmology  1996–2000 RESEARCH ASSISTANT, The University of Chicago. Supervised by David Schramm, Michael Turner. Nuclear data evaluation and uncertainty estimation for big-bang nucleosynthesis.  1997–2000 GUEST/LAB GRADUATE STUDENT, Argonne National Laboratory, Physics Division. Supervised by R. B. Wiringa. Calculation of ${}^2\text{H}(\alpha, \gamma){}^6\text{Li}$ , ${}^3\text{H}(\alpha, \gamma){}^7\text{Li}$ , and ${}^3\text{He}(\alpha, \gamma){}^7\text{Be}$ cross sections from realistic nucleon-nucleon interactions, via quantum Monte Carlo methods (Ph.D. thesis)  1994–1995 UNDERGRADUATE THESIS, M.I.T. Supervised by Alan Guth. Thesis title: “Closed Timelike Curves Around Moving Cosmic Strings”  1992–1993 M.I.T. UNDERGRADUATE RESEARCH OPPORTUNITIES PROGRAM. Supervised by Simon Mochrie. Design and assembly of apparatus to study x-ray scattering from ordered colloids. Computer simulation of order/disorder transitions on silicon surfaces.

<b>Top 5 Career Publications</b>	<p>(Refereed citation counts from the ADS Database, as of April 9, 2010. Numbers in parentheses are totals including unrefereed/not-yet-refereed citations.)</p> <p>Scott Burles, Kenneth M. Nollett, and Michael S. Turner, “Big-bang nucleosynthesis predictions for precision cosmology,” <i>Astrophys. J. Lett.</i> <b>552</b>, L1 (2001). 262 (325) citations.</p> <p>Scott Burles, Kenneth M. Nollett, James W. Truran, and Michael S. Turner, “Sharpening the predictions of big-bang nucleosynthesis,” <i>Phys. Rev. Lett.</i>, <b>82</b>, 4176 (1999). 143 (183) citations.</p> <p>Scott Burles, Kenneth M. Nollett, and Michael S. Turner, “What is the BBN prediction for the baryon density and how reliable is it?” <i>Phys. Rev. D</i> <b>63</b>, 063512 (2001). 66 (86) citations.</p> <p>Kenneth M. Nollett, M. Busso, and G. J. Wasserburg, “Cool bottom Processes on the Thermally-pulsing AGB and the Isotopic Composition of Circumstellar Dust Grains,” <i>Astrophys. J.</i> <b>582</b>, 1036 (2003). 64 (96) citations</p> <p>S. Peng Oh, Kenneth M. Nollett, Piero Madau, and G. J. Wasserburg, “Did massive stars pre-enrich and reionize the universe?” <i>Astrophys. J. Lett.</i> <b>562</b>, L1 (2001). 49 (60) citations.</p>
<b>Selected Publications by Category</b>	<p><b>Cosmology</b></p> <p>Scott Burles, Kenneth M. Nollett, and Michael S. Turner, “Big-bang nucleosynthesis predictions for precision cosmology,” <i>Astrophys. J. Lett.</i> <b>552</b>, L1 (2001). 262 (325) citations: Presents analytic fits to the predictions of big-bang nucleosynthesis (BBN) theory, with error bars, as functions of the universal mean baryon density and examines consequences of observational constraints on BBN.</p> <p>Kenneth M. Nollett and Scott Burles, “Estimating reaction rates and uncertainties for primordial nucleosynthesis,” <i>Phys. Rev. D</i> <b>61</b>, 123505 (2000). 49 (60) citations: Presents an improved Monte Carlo method for propagating uncertainties in nuclear cross sections through to predictions of BBN, discusses of each of eleven critical reaction rates, and displays results of the method; the error-propagation method takes full account of the nature of the nuclear error bars and defines errors in a way that allows new measurements to reduce the size of the uncertainties.</p> <p><b>Stellar Nucleosynthesis &amp; Presolar Grains</b></p> <p>Kenneth M. Nollett, M. Busso, and G. J. Wasserburg, “Cool bottom Processes on the Thermally-pulsing AGB and the Isotopic Composition of Circumstellar Dust Grains,” <i>Astrophys. J.</i> <b>582</b>, 1036 (2003). 64 (96) citations: Presents a full exploration of the consequences of “extra” mixing inside asymptotic giant branch stars, across a wide range of the available parameter space; examines consequences of the model for the compositions of presolar grains recovered from meteorites, and compare the results to the grain data.</p> <p><b>Scattering &amp; Reactions of Light Nuclei</b></p> <p>Kenneth M. Nollett, R. B. Wiringa, and R. Schiavilla, “Six-body calculation of the alpha-deuteron radiative capture cross section,” <i>Phys. Rev. C</i> <b>63</b>, 024003 (2001). 18 (22) citations: Presents a proof-of-principle calculation for quantum Monte Carlo computation of nuclear cross sections in <math>A &gt; 4</math> systems from bare nucleon-nucleon interactions and appropriate current operators.</p>

Kenneth M. Nollett, Steven C. Pieper, R. B. Wiringa, J. Carlson, and G. M. Hale, “Quantum Monte Carlo calculations of neutron-alpha scattering,” *Phys. Rev. Lett.* **99**, 022502 (2007).

28 (32) citations: Reports the first-ever exact, *ab initio*, calculation of scattering in a system of more than four nucleons; this is a crucial step toward reliable calculations of astrophysical reaction cross sections from first principles.

**Rapid-Review Publications** Scott Burles, Kenneth M. Nollett, James W. Truran, and Michael S. Turner, “Sharpening the predictions of big-bang nucleosynthesis,” *Phys. Rev. Lett.*, **82**, 4176 (1999). 143 citations.

Scott Burles, Kenneth M. Nollett, and Michael S. Turner, “Big-bang nucleosynthesis predictions for precision cosmology,” *Astrophys. J. Lett.* **552**, L1 (2001). 262 citations.

S. Peng Oh, Kenneth M. Nollett, Piero Madau, and G. J. Wasserburg, “Did massive stars pre-enrich and reionize the universe?” *Astrophys. J. Lett.* **562**, L1 (2001). 49 citations.

Kenneth M. Nollett, Steven C. Pieper, R. B. Wiringa, J. Carlson, and G. M. Hale, “Quantum Monte Carlo calculations of neutron-alpha scattering,” *Phys. Rev. Lett.* **99**, 022502 (2007). 28 citations.

**Invited Refereed Publications** G. J. Wasserburg, M. Busso, R. Gallino, and K. M. Nollett, “Short-lived radioactivities in the early solar system: possible AGB sources,” *Nucl. Phys. A* **777**, 5 (2006). 40 citations.

L. E. Marcucci, Kenneth M. Nollett, R. B. Wiringa, and R. Schiavilla, “Modern theories of low-energy nuclear reactions,” *Nucl. Phys. A* **777**, 111 (2006). 14 citations.

**Other Refereed Publications** Kenneth M. Nollett, Martin Lemoine, and David N. Schramm, “Nuclear Reaction Rates and Primordial  $^6\text{Li}$ ,” *Phys. Rev. C* **56**, 1144 (1997). 27 citations.

Kenneth M. Nollett and Scott Burles, “Estimating reaction rates and uncertainties for primordial nucleosynthesis,” *Phys. Rev. D* **61**, 123505 (2000). 49 citations.

Kenneth M. Nollett, R. B. Wiringa, and R. Schiavilla, “Six-body calculation of the alpha-deuteron radiative capture cross section,” *Phys. Rev. C* **63**, 024003 (2001). 18 citations.

Scott Burles, Kenneth M. Nollett, and Michael S. Turner, “What is the BBN prediction for the baryon density and how reliable is it?” *Phys. Rev. D* **63**, 063512 (2001). 64 citations.

Kenneth M. Nollett, “Radiative alpha-capture cross sections from realistic nucleon-nucleon interactions and variational Monte Carlo wave functions,” *Phys. Rev. C* **63**, 054002 (2001). Based on thesis work. 18 citations.

Kenneth M. Nollett and Robert E. Lopez, “Primordial nucleosynthesis with a varying fine structure constant: An improved estimate,” *Phys. Rev. D* **66**, 063507 (2002). 40 citations.

Kenneth M. Nollett, M. Busso, and G. J. Wasserburg, “Cool bottom Processes on the Thermally-pulsing AGB and the Isotopic Composition of Circumstellar Dust Grains,” *Astrophys. J.* **582**, 1036 (2003). 64 citations.

Wick C. Haxton, Kenneth M. Nollett, and Kathryn M. Zurek, “The Piecewise Moments Method: A Generalized Lanczos Technique for Nuclear Response Surfaces,” *Phys. Rev. C* **72**, 065501 (2005). 4 citations.

M. Busso, G. J. Wasserburg, Kenneth M. Nollett, and A. Calandra, “Can extra mixing in RGB and AGB stars be attributed to magnetic mechanisms?” *Astrophys. J.* **671**, 802 (2007). 17 citations.

Gilbert P. Holder, Kenneth M. Nollett, and Alexander van Engelen “On Possible Variation in the Cosmological Baryon Fraction,” *Astrophys. J.*, 716, 907 (2010). 1 citation

E. G. Adelberger *et al.* “Solar fusion cross sections II: the pp chain and CNO cycles,” submitted to *Rev. Mod. Phys.*, arXiv:1004.2318 [nucl-ex].

In this comprehensive re-analysis of nuclear properties for solar-neutrino studies, I made major contributions to the sections on the reactions  ${}^3\text{He}(\alpha, \gamma){}^7\text{Be}$  and  ${}^7\text{Be}(p, \gamma){}^8\text{B}$ .

**Popular-Level Article** Kenneth Nollett, “Testing the elements of the Big Bang,” *Physics World* Vol. 20, No. 8, p. 20 (August 2007).

**Book Edited** *Opportunities with Exotic Beams: Proceedings of the Third ANL/MSU/JINA/INT RIA Workshop*, eds. T. Duguet, H. Esbensen, K. M. Nollett, and C. D. Roberts. (World Scientific: Singapore 2007) ISBN 978-9812705679 (Primary responsibility for collecting latex contributions and assembling them for handoff to the publisher.)

**Summer-School Lectures** 14TH EURO SUMMER SCHOOL ON EXOTIC BEAMS, Lecturer on topic “*Ab initio* calculations of light nuclei.” Four lectures of three hours total, Houlgate, France, August 26–31, 2007

**Invited Conference Talks** *Radiative captures in astrophysics and nucleosynthesis*, LOWq WORKSHOP ON ELECTRO-MAGNETIC NUCLEAR REACTIONS AT LOW MOMENTUM TRANSFER, Halifax, NS, Canada, August 2001

*Time-varying constants, the nucleon mass difference, and big-bang nucleosynthesis*, Invited session on charge symmetry breaking, AMERICAN PHYSICAL SOCIETY APRIL MEETING, Philadelphia, PA, April 2003

*How fast, realistically: ab initio calculations of low-energy astrophysical reaction rates*, Invited session on recent developments in computational nuclear physics, AMERICAN PHYSICAL SOCIETY APRIL MEETING, Denver, CO, May 2004

*Venturing into the continuum with quantum Monte Carlo*, 2005 GORDON RESEARCH CONFERENCE ON NUCLEAR CHEMISTRY, New London, NH, July 2005

*Quantum Monte Carlo: Not Just for Energy Levels Anymore*, THIRD ARGONNE/MSU/INT/JINA RIA THEORY WORKSHOP, Argonne National Laboratory, April 2006

*Quantum Monte Carlo studies of bound and unbound states*, 7TH INTERNATIONAL CONFERENCE ON RADIOACTIVE NUCLEAR BEAMS, Cortina d’Ampezzo, Italy, July 2006

*Quantum Monte Carlo studies of bound and unbound nuclear states*, NUCLEAR STRUCTURE ’06: CONFERENCE ON NUCLEI AT THE LIMITS, Oak Ridge, TN, July 2006

*Reactions, scattering, ab initio nuclear theory, and astrophysics*, WORKSHOP ON NUCLEONS AND NUCLEI, Washington, DC, October 2006

*Scattering and reactions in ab initio nuclear theory*, PRE-MEETING WORKSHOP: “EXOTIC NUCLEI: FROM THE LABORATORY TO THE COSMOS,” AMERICAN PHYSICAL SOCIETY DIVISION OF NUCLEAR PHYSICS FALL MEETING, Nashville, TN, October 2006

*Combining structure, reactions, NN potentials, and astrophysics through ab initio nuclear theory*, TOWN MEETING FOR THE NSAC (NUCLEAR SCIENCE ADVISORY COMMITTEE) LONG-RANGE PLAN, Chicago, IL, January 2007

*Quantum Monte Carlo, continuum states, and the three-nucleon interaction*, WORKSHOP ON THREE-NUCLEON INTERACTIONS FROM FEW- TO MANY-BODY SYSTEMS, TRIUMF, Vancouver, BC, Canada, March 2007

*What's the matter with lithium?* Invited session on nucleosynthesis of the lightest nuclei, AMERICAN PHYSICAL SOCIETY APRIL MEETING, Jacksonville, FL, April 2007

*Recent insights into light nuclei from quantum Monte Carlo*, 2007 GORDON RESEARCH CONFERENCE ON NUCLEAR CHEMISTRY, New London, NH, June 2007

*Nuclear quantum Monte Carlo: Expanding into the continuum*, 20TH EUROPEAN CONFERENCE ON FEW-BODY PROBLEMS IN PHYSICS, Pisa, Italy, September 2007

*Soft photons and light nuclei: astrophysical implications*, WORKSHOP ON SOFT PHOTONS AND LIGHT NUCLEI, Institute for Nuclear Theory, Seattle, WA, June 2008

*Quantum Monte Carlo methods*, WORKSHOP ON CONTINUUM COUPLING CLOSE TO THE DRIP LINES, CEA Saclay, Gif-sur-Yvette, France, May 2009

*The outer limits of quantum Monte Carlo calculations*, SIXTH ARGONNE/MSU/INT/JINA FRIB THEORY WORKSHOP: COMPUTATIONAL FOREFRONT IN NUCLEAR THEORY, Argonne National Laboratory, March 2010

*Scattering, reactions, and related quantities in nuclear quantum Monte Carlo*, WORKSHOP ON FINITE-VOLUME EFFECTS IN FEW-BODY SYSTEMS, Institute for Nuclear Theory, Seattle, WA, April 2010

## Seminars

*Few-body nuclear physics in the big bang*, T-5 (Medium-Energy Theory) Group Seminar, LOS ALAMOS NATIONAL LABORATORY, December 1999

*Few-body nuclear physics in the big bang*, TRIUMF SEMINAR, Vancouver, BC, Canada, January 2000

*Nuclear structure and alpha captures on light nuclei*, Kellogg Radiation Laboratory Seminar, CALIFORNIA INSTITUTE OF TECHNOLOGY, April 2001

*Mixing in giant stars and its signatures in stellar spectra and presolar grains*, Nuclear Theory Seminar, ARGONNE NATIONAL LABORATORY, September 2001

*Mixing in giant stars and its signatures in stellar spectra and presolar grains*, T-16 (Nuclear Theory) Group Seminar, LOS ALAMOS NATIONAL LABORATORY, January 2002

*Mixing in giant stars and its signatures in stellar spectra and presolar grains*, Physics Division Seminar, ARGONNE NATIONAL LABORATORY, February 2002

*Mixing in giant stars and its signatures in stellar spectra and presolar grains*, Nuclear Physics Seminar, OHIO UNIVERSITY, Athens, OH, March 2002

*Nuclear structure and alpha captures on light nuclei*, Nuclear Science Seminar, MICHIGAN STATE UNIVERSITY, September 2002

*Primordial nucleosynthesis with a time-varying fine-structure constant*, TRIUMF THEORY SEMINAR, Vancouver, BC, Canada, May 2003

*Variational Monte Carlo calculations of  $A = 6$  and  $7$  radiative capture cross sections*, INSTITUTE FOR NUCLEAR THEORY SEMINAR, University of Washington, October 2003

*Astrophysical Reaction Rates from Realistic Nuclear Forces and Currents*, Physics Division Seminar, ARGONNE NATIONAL LABORATORY, May 2004

*Big bang nucleosynthesis, with and (mostly) without weird stuff*, ASTROPHYSICS AT ARGONNE LUNCH SEMINAR, June 2004

*Harnessing recent advances in nuclear physics for astrophysics*, JINA Seminar, THE UNIVERSITY OF CHICAGO, November 2004

*Scattering, reactions and astrophysics with modern nuclear interactions*, Astrophysics Seminar, UNIVERSITY OF NOTRE DAME, February 2005, and Nuclear Science Seminar, MICHIGAN STATE UNIVERSITY, February 2005

*Nuclear Physics in the pp Chain, r-Process, and x-Process*, Physics Division Colloquium, ARGONNE NATIONAL LABORATORY, May 2006

*The cosmological context of nuclear astrophysics*, ASTROPHYSICS AT ARGONNE LUNCH SEMINAR, February 2007

*Scattering, reactions, and astrophysics with modern nuclear interactions*, Astrophysical Institute and Institute for Nuclear and Particle Physics Seminar, OHIO UNIVERSITY, Athens, OH, May 2007

*The puzzle of the nitrogen isotopic composition of presolar grains* (delivered half-and-half with A. Karakas of Mt. Stromlo Observatory), JINA Seminar, THE UNIVERSITY OF CHICAGO, September 2007

*What are carbon, nitrogen, and oxygen isotopes in stardust trying to tell us?* Space Sciences Seminar, WASHINGTON UNIVERSITY, St. Louis, MO, December 2007

*What do presolar grains tell us about what's happening inside low-mass stars?* Astrophysics Seminar, MCGILL UNIVERSITY, Montreal, Canada, February 2008

*Some puzzles in the origins of carbon, nitrogen, and oxygen*, Physics Division Colloquium, ARGONNE NATIONAL LABORATORY, March 2008

*Pin the Tail on the Wave Function*, Heavy-Ion Discussion Group, ARGONNE NATIONAL LABORATORY, May 2008

*A potpourri of lithium problems*, Kavli Institute for Cosmological Physics Lunch Seminar, UNIVERSITY OF CHICAGO, January 2009

*Fusion cross sections in the Sun*, Astrophysics at Argonne Lunch Seminar, ARGONNE NATIONAL LABORATORY, May 2009

*The puzzling behavior of lithium in stellar surface layers*, High Energy Physics Division Lunch Seminar, ARGONNE NATIONAL LABORATORY, January 2010

**Contributed  
Conference  
Talks**

*Where are the major uncertainties in big bang nucleosynthesis?* SECOND WORKSHOP ON FRONTIERS OF NUCLEAR ASTROPHYSICS, East Lansing, MI, July 1999

*Cool Bottom Processes in Low Mass Stars and  $^{26}\text{Al}$  Production*, ELEVENTH ANNUAL V. M. GOLDSCHMIDT CONFERENCE (Geochemistry), Hot Springs, VA, May 2001 (with M. Busso and G. J. Wasserburg)

*Cool Bottom Processing on the AGB and Presolar Grain Compositions*, 33RD LUNAR AND PLANETARY SCIENCE CONFERENCE, Houston, TX, March 2002 (with M. Busso and G. J. Wasserburg)

*Spectroscopic Factors and Particle Widths in Light Nuclei*, APS DIVISION OF NUCLEAR PHYSICS FALL MEETING, Chicago, IL, October 2004 (with J. P. Schiffer, K. E. Rehm, and A. H. Wuosmaa)

*Quantum Monte Carlo as a tool for astrophysics*, FRONTIERS 2005 WORKSHOP (Nuclear Astrophysics), East Lansing, MI, August 2005

*Toward ab initio calculations of astrophysical reaction rates*, TENTH INTERNATIONAL SYMPOSIUM ON NUCLEI IN THE COSMOS, Mackinac Island, MI, July 2008

**Other  
Abstracts &  
Proceedings**

(Posters, or presented by one of the other authors)

K. M. Nollett and S. Burles, "Improved use of Inputs to Primordial Nucleosynthesis," *The Light Elements and their Evolution*, Proceedings of the IAU Symposium 198 (2000), p. 120

M Busso, K. M. Nollett, and G. J. Wasserburg, “Implications of cool bottom processes in thermally pulsing phases of AGB stars,” *Proceedings of the 11th Workshop on Nuclear Astrophysics* (Ringberg Castle, 2002), p. 18

L. R. Nittler, P. Hoppe, C. M. O’D. Alexander, M. Busso, R. Gallino, K. K. Marhas and K. Nollett, “Magnesium Isotopes in Presolar Spinel,” *Lunar Planet. Sci. Conf.* **34**, 1703 (2003)

J. Carlson and Kenneth M. Nollett, “Microscopic Approaches to Light-Nucleus Reactions,” *International Conference on Nuclear Data for Science and Technology*, AIP Conference Proceedings **769**, 1289 (2005)

Muslema Pervin, R. B. Wiringa, Steven C. Pieper, and Kenneth M. Nollett, “Ab Initio calculations of Electroweak Matrix Elements,” *Bull. Am. Phys. Soc.* **51**, 20 (2006)

**Professional  
Activities**

REFeree FOR:

Journal of High Energy Physics, Atomic Data and Nuclear Data Tables, Nuclear Physics A, Physical Review Letters, Physics Letters B, Journal of Physics G, European Physical Journal A, Europhysics Letters

CO-ORGANIZER, Second Argonne/MSU/JINA/INT RIA Workshop: “Reaction Mechanisms for Rare Isotope Beams,” East Lansing, Michigan, March 9–12, 2005

CO-ORGANIZER, Third Argonne/MSU/JINA/INT RIA Workshop, Argonne National Laboratory, April 4–7, 2006

CO-ORGANIZER, “ASTROPHYSICS AT ARGONNE” LUNCH SEMINAR SERIES

Primary responsibility for organizing monthly seminars with a strong pedagogical aspect in an area in which Argonne is expanding, since April 2004

MEMBER, ARGONNE ASTROPHYSICS STEERING COMMITTEES, 2005–2008

Member of two committees to define and implement an astrophysics initiative across multiple divisions at Argonne; second committee advised on allocation of \$1.52M in Laboratory-Directed Research & Development funds in FY2008

**Student  
Supervision**

CALIFORNIA INSTITUTE OF TECHNOLOGY

SUMMER UNDERGRADUATE RESEARCH FELLOWSHIP PROGRAM

Mentor, Summer 2002

ARGONNE NATIONAL LABORATORY

UNDERGRADUATE SUMMER PROGRAMS

Summer Research Aide supervisor, Summer 2006

Student Research Participation Program supervisor, Summer 2007

(The difference in these two titles reflects only the citizenship of the students.)

DOE Summer Undergraduate Laboratory Internships Program mentor, Summer 2008

UNIVERSITY OF CHICAGO UNDERGRADUATE THESIS MENTOR, 2007-2008 Academic Year  
Supervised undergraduate honors thesis of Brent Graner (2007 summer student at Argonne. Official advisor at the University was Prof. Zheng-Tian Lu, who holds a joint appointment.)

**Classroom  
Teaching**

THE UNIVERSITY OF CHICAGO, DEPARTMENT OF PHYSICS, Teaching Assistant

Physics 131–133, Introductory physics sequence, 1995–96 academic year

Physics 141–143, Honors introductory physics sequence, 1996–97 academic year

**Competitive  
Grant  
Funding**

ARGONNE LABORATORY-DIRECTED RESEARCH & DEVELOPMENT (LDRD)

*Co-investigator, Fiscal Years 2006-2008: "Advancing Nuclear Theory for a Rare Isotope Accelerator: Nuclear Structure and Reactions for Astrophysics"*

\$100k/year to support a collaborative theory initiative with the University of Notre Dame. (This catalyzed approximately matching funds from the Notre Dame Office of Research.)

*Co-investigator, Fiscal Year 2007: "Simulations and Hardware Development for Astrophysics"*

\$150k spread among three laboratory divisions to expand astrophysics activities at Argonne

*Co-investigator, Fiscal Year 2008-2009: "Nuclear Astrophysics"*

\$190k/year for Physics Division participation in first year of a laboratory Strategic Initiative in astrophysics; approximately \$70k of this was allocated for my group.

(In the first year, this was the top-ranked of 11 proposals, down-selected from 16 pre-proposals and two renewals taken over from earlier Strategic Initiatives.)

JOINT THEORY INSTITUTE OF THE UNIVERSITY OF CHICAGO AND ARGONNE NATIONAL LABORATORY

*Investigator, Fiscal Year 2007: "Extra mixing in asymptotic giant branch stars and consequences for pre-solar grains"*

\$35k to bring a visitor to Chicago and Argonne for collaboration with me and with experts in measurements of presolar grains at both institutions